

REMARKS

The Office Action mailed January 27, 2003, has been reviewed and the comments of the Patent and Trademark Office have been considered. Claim 16 has been cancelled without prejudice or disclaimer. Claim 13 has been amended. Support for this amendment to claim 13 can be found at least in original claim 16, in the specification on page 8, paragraph 28, page 9, paragraph 39, and in the accompanying Figures. No new matter has been added. Claims 1-13, 15 and 17-21 are pending in this application. Of these claims, claims 13, 15, 17-19 and 21 are pending for consideration on the merits, with the other claims being withdrawn at this time.

Allowable subject matter

Applicants appreciate the indication that claim 15 would be allowable if rewritten in independent form. Applicants have not amended claim 15 at this time, however, because applicants believe that claim 13, from which claim 15 depends, is allowable for the reasons given below.

Rejections under 35 U.S.C. §§ 102 and 103

Claims 13, 16-17, 19 and 21 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,060,686 to Jones (hereafter "Jones"). Claim 18 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of U.S. Patent No. 3,632,955 to Cruickshank (hereafter "Cruickshank"). Applicants respectfully traverse these rejections for at least the following reasons.

Claim 13

Independent claim 13 has been amended to recite "supplying a welding wire from within the nozzle to the certain point." Supplying the welding wire from within the nozzle provides some advantages. As disclosed in the present specification on page 9, paragraph 39, when the welding wire is guided within the nozzle, the welding wire can be dried by

the gas supplied to the welding point. Thus, a stable gas atmosphere for welding is realized (see present specification, page 9, paragraph 40).

Jones fails to disclose supplying a welding wire from within the nozzle to the welding point, or its attendant advantages. Jones discloses providing a filler material 26a in wire form to a nozzle outlet (col. 4, lines 52-62). The filler wire 26a of Jones, however, is supplied to the welding point from outside the nozzle 20 (see Figure 2). Thus, Jones fails to disclose the feature of claim 13 where the welding wire is supplied from within the nozzle to the certain point, and fails to anticipate that claim.

Moreover, the Jones system does not suggest the advantages attendant with supplying a welding wire from within the nozzle. Because the Jones system supplies the filler wire 26a from outside the nozzle, end slot 20f is required in the nozzle outlet 20c (col. 4, lines 63-66). The end slot 20f allows gas to escape through the slot, and thus trapping gas is more difficult. This disadvantage increases when the nozzle is inclined to the workpiece such as shown in Figure 2. By contrast, in the present invention as recited in claim 13, no end slots are required in the nozzle because the wire is supplied from within the nozzle, and further the wire remains dry.

Cruickshank was cited for allegedly teaching separating visible light by a dichroic mirror and inputting the separated visible light into an image sensor. Cruickshank, however, like Jones, does not disclose supplying a welding wire from within the nozzle to the welding point. Thus, even if Jones and Cruickshank were combined, the combination would not meet the limitations of claim 13.

Claim 19

Independent claim 19 recites adjusting a gap between the nozzle and the workpiece using a gap adjuster positioned between the optical head and the workpiece. Jones fails to

disclose this feature of claim 19. Jones discloses maintaining a gap in quite a different way from the method of claim 19. Specifically, Jones discloses maintaining a standoff gap G to allow suitable traversing of nozzle 20 during operation using a carriage 24 affixed to the nozzle (see Figure 1, col. 4, lines 5-8). Jones discloses that this carriage 24 may be a multi-axis machine tool (col. 4, lines 8-12). The carriage 24 of Jones, however, is not positioned between the optical head and the workpiece as can be seen in Figure 1 of Jones. Thus, Jones discloses adjusting the gap in a very different fashion from claim 19.

The Office Action appears to equate the carriage 24 of Jones with the sliding member of claim 21. Even if the carriage 24 of Jones could be considered a sliding member, however, Jones still fails to disclose the invention as recited in claim 19, at least because the carriage 24 of Jones is not positioned between the optical head and the workpiece. For at least these reasons, claim 19 (and claim 21 which depends therefrom) is patentable over Jones.

As mentioned above with respect to claim 13, Cruickshank was cited for allegedly teaching separating visible light by a dichroic mirror and inputting the separated visible light into an image sensor. Cruickshank, however, like Jones, does not disclose adjusting a gap between the nozzle and the workpiece using a gap adjuster positioned between the optical head and the workpiece. Thus, even if Jones and Cruickshank were combined, the combination would not meet the limitations of claim 19.

Independent claims 13 and 19 are patentable over Jones and Cruickshank for at least the reasons given above. The dependent claims ultimately depend from either claim 13 or claim 19, and are patentable for at least the same reasons, as well as for further patentable features recited therein.

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For at least the reasons given above, applicants respectfully request that the rejections under 35 U.S.C. 102 and 103 be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, applicants respectfully submit that all of the pending claims are now in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the Examiner is invited to contact the undersigned at the number below.

Respectfully submitted,

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Versions with Markings to Show Changes Made

In the Claims:

Please amend claim 13 as follows:

13. (Twice Amended) An underwater laser processing method, comprising:
- irradiating a condensed laser beam generated by a laser source to a certain point of an underwater workpiece; [and]
- supplying gas to the certain point from a nozzle having a gas exit, the nozzle having an area surrounding the gas exit that extends to the surface of the workpiece for keeping the supplied gas between the nozzle and the workpiece, wherein the nozzle is formed as a disk having the gas exit at the center thereof; and
- supplying a welding wire from within the nozzle to the certain point.